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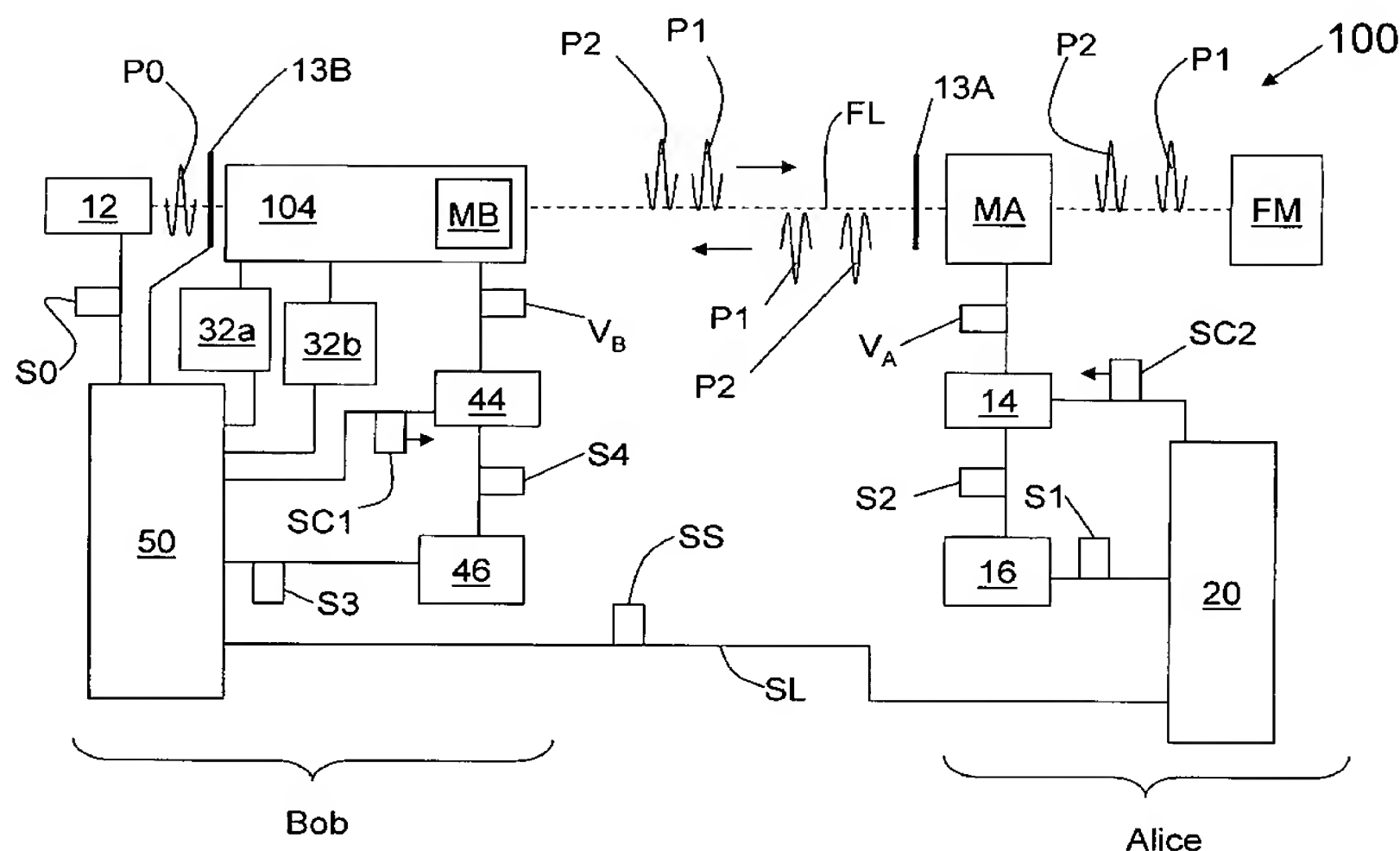
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(54) Title: MODULATOR AUTOCALIBRATION METHODS FOR QKD



(57) **Abstract:** Methods for calibrating the modulators in a QKD system (100) are disclosed. The methods include setting the voltage (V_B) of Bob's modulator (MB) to a positive value and then adjusting the voltage (V_A) of Alice's modulator (MA) in both the positive and negative direction to obtain overall relative phase modulations that result in maximum and minimum photon counts (N) in the two single-photon detectors (32a, 32b). Bob's modulator voltage is then set to a negative value and the process repeated. When the basis voltages ($V_B(1)$, $V_B(2)$, $V_A(1)$, $V_A(2)$, $V_A(3)$ and $V_A(4)$) are established, the QKD system is operated with intentionally selected incorrect bases at Bob and Alice to assess orthogonality of the basis voltages by assessing whether or not the probability of photon detection at the detectors is 50:50. If not, the modulator voltages are adjusted to be orthogonal. This involves changing Bob's basis voltage ($V_B(1)$ and/or $V_B(2)$) and repeating the process until a 50:50 detector count distribution is obtained. The calibration method can be carried out periodically during QKD system operation to ensure optimum or near-optimum operation of the modulators.



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